

**Claims**

1. Gear pump (100) comprising a pump cover (1), an  
internal rotor (16) disposed rotatably in a recess (9)  
5 of the pump cover (1) and formed in a rotationally  
fixed manner on a drivable plug-in shaft (11), and an  
external rotor (19) rotatably disposed in the recess  
(9) of the pump cover (1) in such an eccentric manner  
relative the axis of rotation (A) of the internal rotor  
10 (16) that the external rotor (19) is in mesh with the  
internal rotor (16) only in a first angle-of-rotation  
range ( $\alpha$ ) and in a second angle-of-rotation range ( $\beta$ )  
lying opposite the first angle-of-rotation range ( $\alpha$ ) is  
in contact with an inner surface (25) of a web (23),  
15 which is disposed in the recess (9) and is in turn in  
contact at its outer surface (26) with the external  
rotor (19), so that after closing of the recess (9) by  
a cover plate (27) there is formed in the recess (9) an  
admission pressure chamber (21) and a low-pressure  
20 chamber (22),  
**characterized in**  
that a holding element (33), which is held in the pump  
cover (1), in the initial assembled state of the gear  
pump (100) holds the cover plate (27) at a fixed angle  
25 of rotation on the pump cover (1).
2. Gear pump according to claim 1,  
**characterized in**  
that the cover plate (27) in the final assembled state  
30 of the gear pump (100) is released by the holding  
element (33).

3. Gear pump according to claim 1 or 2,  
**characterized in**  
that the holding element (33) is held in a first recess  
(40) provided in the pump cover (1) and in the initial  
5 assembled state of the gear pump (100) holds the cover  
plate (27) by means of a second recess (32) provided in  
the cover plate (27) at a fixed angle of rotation on  
the pump cover (1).
- 10 4. Gear pump according to claim 3,  
**characterized in**  
that the holding element (33) in the final assembled  
state of the gear pump (100) is displaced in the first  
recess (40) to such an extent that the cover plate (27)  
15 is no longer held by the holding element (33).
5. Gear pump according to one of claims 1 to 4,  
**characterized in**  
that the holding element (33) is made of a deformable  
20 plastics material.
6. Gear pump according to claim 3 or 4,  
**characterized in**  
that the holding element (33) comprises a cylindrical  
25 partial body (39), the outside diameter of which is  
slightly larger than the inside diameter of the first  
recess (40), so that in the course of insertion of the  
holding element (33) into the first recess (40) the  
cylindrical partial body (39) experiences a specific  
30 radial bias, by means of which a force-locking  
connection exists between the holding element (33) and  
the pump cover (1).

7. Gear pump according to claim 6,  
**characterized in**  
that the surface of the cylindrical partial body (39)  
of the holding element (33) has scales.
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8. Gear pump according to claim 6 or 7,  
**characterized in**  
that the cylindrical partial body (39) of the holding  
element (33) for receiving a screw (51) has an inner  
10 bore (47), the inside diameter of which approximately  
corresponds to the outside diameter of the screw (51).
9. Gear pump according to one of claims 6 to 8,  
**characterized in**  
15 that adjoining the cylindrical partial body (39) is a  
conical partial body (41), which is passed through the  
second recess (32) and in the final assembled state of  
the pump cover (1) is in contact by its outer surface  
(42) with the second recess (32) of the cover plate  
20 (27) in such a way that by means of the holding element  
(33) a positive connection is realized between the pump  
cover (1) and the cover plate (27).
10. Gear pump according to claim 8,  
25 **characterized in**  
that a portion (53) of an inner bore, which is situated  
in the conical partial body (41) in a continuation of  
an inner bore portion (47) situated in the cylindrical  
partial body (39) and the diameter of which is designed  
30 smaller than the diameter of the inner bore portion  
(47) situated in the cylindrical partial body (39), is  
used to ventilate the first recess (40) of the pump  
cover (1).

11. Gear pump according to claim 9 or 10,

**characterized in**

that the conical partial body (41) in its area (44) has  
an annular recess (43), the annular area of which  
5 tapers with increasing recess depth in such a way that  
up to the height of the base of the annular recess (43)  
there are formed in the centre of the conical partial  
body (41) a cylindrical bottom partial body (45) and at  
the periphery of the conical partial body (41) a  
10 hollow-cone-shaped bottom partial body (46) of a  
constant wall thickness.

12. Gear pump according to claim 11,

**characterized in**

15 that the conical partial body (41) owing to the annular  
recess (43) is deformable in such a way that it is  
introducible by its hollow-cone-shaped bottom partial  
body (46) entirely into the first recess (40) in the  
final assembled state of the gear pump (100).

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13. Gear pump according to claim 11 or 12,

**characterized in**

that the cylindrical bottom partial body (45) is  
lengthened compared to the area (44) of the conical  
25 partial body (41) by the thickness of the cover plate  
(27), so that in the final assembled state of the gear  
pump (100) the hollow-cone-shaped bottom partial body  
(46) is introduced entirely into the first recess (40)  
and there is therefore no longer any contact with the  
30 cover plate (27).

14. Gear pump according to claim 11 or 12,

**characterized in**

that the hollow-cone-shaped bottom partial body (46) is adjoined by a hollow-cylindrical bottom partial body (52), the height of which corresponds to the thickness of the cover plate (27), so that in the final assembled state of the gear pump (100) the hollow-cone-shaped bottom partial body (46) is introduced entirely into the first recess (40) and there is therefore no longer any contact with the cover plate (27).

10 15. Gear pump according to one of claims 1 to 14,  
**characterized in**

that the web (23) in the recess (9) of the pump cover (1) is sickle-shaped.

15 16. Gear pump according to one of claims 1 to 15,  
**characterized in**

that in the final assembled state of the gear pump (100) the pump cover (1) with the cover plate (27) at a fixed angle of rotation is fastened by means of screw connections to a connection plate (4) of a hydraulic pump.

17. Gear pump according to claim 16,  
**characterized in**

25 that the admission pressure chamber (21) is connected by kidney-shaped recesses (30) in the cover plate (27) and the connection plate (4) to an intake channel of the hydraulic pump and the low-pressure chamber (22) is connected by kidney-shaped recesses (31) in the cover  
30 plate (27) and the connection plate (4) to a hydraulic tank.

18. Gear pump according to claim 16 or 17,  
**characterized in**  
that the plug-in shaft (11) is rotatably mounted in a  
first plain bearing (10) in the pump cover (1) and in a  
5 second plain bearing (13) in the connection plate (4).
19. Gear pump according to one of claims 1 to 18,  
**characterized in**  
that the internal rotor (16) is fastened by a clamping  
10 key (15), which engages into a keyway (19) of the  
internal rotor (16), in a rotationally fixed manner to  
the plug-in shaft (11).
20. Gear pump according to one of claims 1 to 19,  
15 **characterized in**  
that the plug-in shaft (11) in the final assembled  
state of the gear pump (100) is fixed in its axial  
position by means of a round ring (38), which is fitted  
on the plug-in shaft (11) at the level of the cover  
20 plate (27).
21. Holding element (33) comprising a cylindrical partial  
body (39), which is introducible into a recess (40) of  
a first article with a simultaneous build-up of a  
25 radial bias in such a way that a force-locking  
connection is established between the holding element  
(33) and the first article, and a conical partial body  
(41), which adjoins the cylindrical partial body (39)  
and in an initial assembled state is passed through a  
30 recess (32) of a second article and is in contact with  
the recess (32) of the second article in such a way  
that by means of the holding element (33) a positive

connection is realized between the first article and the second article.

22. Holding element according to claim 21,

5       **characterized in**

that the surface of the cylindrical partial body (39) of the holding element (33) has scales.

23. Holding element according to claim 21 or 22,

10       **characterized in**

that the cylindrical partial body (39) of the holding element (33) for receiving a screw (51) has an inner bore (47), the inside diameter of which approximately corresponds to the outside diameter of the screw (51).

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24. Holding element according to one of claims 21 to 23,

**characterized in**

that an inner bore portion (53), which is situated in the conical partial body (41) in continuation of an inner bore portion (47) situated in the cylindrical partial body (39) and the diameter of which is designed smaller than the diameter of the inner bore portion (47) situated in the cylindrical partial body (39), is used to ventilate the recess (40) of the first article.

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25. Holding element according to one of claims 21 or 24,

**characterized in**

that the conical partial body (41) in its area (44) has an annular recess (43), the annular area of which tapers with increasing recess depth in such a way that up to the height of the base of the annular recess (43) there are formed in the centre of the conical partial body (41) a cylindrical bottom partial body (45) and at

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the periphery of the conical partial body (41) a hollow-cone-shaped bottom partial body (46) of a constant wall thickness.

- 5 26. Holding element according to claim 25,  
**characterized in**

that the conical partial body (41) owing to the annular recess (43) is deformable in such a way that in a second assembled state it is introducible by its  
10 hollow-cone-shaped bottom partial body (46) entirely into the recess (40) of the first article.

27. Holding element according to one of claims 21 to 26,  
**characterized in**

15 that the cylindrical bottom partial body (45) is lengthened compared to the area (44) of the conical partial body (41) by the thickness of the second article, so that in the second assembled state the hollow-cone-shaped bottom partial body (46) is inserted  
20 entirely into the recess of the first article and there is therefore no longer any contact with the second article.

28. Holding element according to claim 25 or 26,  
25 **characterized in**

that the hollow-cone-shaped bottom partial body (46) is adjoined by a hollow-cylindrical bottom partial body (52), the height of which corresponds to the thickness of the second article, so that in the final assembled  
30 state of the first and second article the hollow-cone-shaped bottom partial body (46) is inserted entirely into the recess of the first article and there is



therefore no longer any contact with the second article.